

# MISSION OPERATIONS DIRECTORATE FACILITY AND SUPPORT SYSTEMS DIVISION



REQUIREMENTS ANALYSIS FUNDAMENTALS  
NOVEMBER 9, 1988

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11/10/88  
22291-1988  
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## INTRODUCTION

### ADVANCED PROJECTS SECTION

- ELEMENT WITHIN MISSION OPERATIONS DIRECTORATE
- RESPONSIBILITIES
  - DEVELOP/COORDINATE USER REQUIREMENTS FOR GROUND INFORMATION SYSTEMS SOFTWARE (E.G., MISSION CONTROL CENTER UPGRADE) AND TRANSMIT TO DEVELOPER.
  - REPRESENT OPERATIONS COMMUNITY (USERS) TO DEVELOPER.
  - REPRESENT DEVELOPER TO USERS.
  - DEVELOP/PROTOTYPE USER APPLICATIONS.
  - PROVIDE CONFIGURATION MANAGEMENT OVERSIGHT FOR USER APPLICATIONS.

## PROBLEM

- SOFTWARE PRODUCTS OF THE CURRENT DEVELOPMENT PROCESS OFTEN DO NOT FULLY MEET "TRUE" USER NEEDS UPON DELIVERY.
  - DELIVERY OF NEEDED CAPABILITIES IS DELAYED.
  - COST OF CORRECTING SYSTEMS AFTER DELIVERY IS HIGH.
- PROBLEM IS ROOTED IN REQUIREMENTS DEFINITION AND ANALYSIS PROCESS.

## CAUSES

- REQUIREMENTS DEFINITION FOR CONTEMPORARY INFORMATION SYSTEMS IS INHERENTLY DIFFICULT.
  - HIGH HUMAN/COMPUTER INTERACTION
  - APPLICATIONS DEVELOPED BY USER COMPLICATES APPLICATION INTERFACE REQUIREMENTS DEVELOPMENT
- REQUIREMENTS CHANGE RAPIDLY.
  - USER POPULATION IS DYNAMIC.
  - USER APPLICATIONS ARE CONSTANTLY EVOLVING.
  - NEW PROGRAMS (E.G., SPACE STATION) INTRODUCE NEW OPERATIONS CONCEPTS.
  - NEW TECHNOLOGY IS CONSTANTLY EMERGING.
  - EXPERIENCE WITH CURRENT SYSTEM UNCOVERS NEW REQUIREMENTS.

## CAUSES (CONTINUED)

- REQUIREMENTS ARE OFTEN INCOMPLETE/CONFLICTING DUE TO DIVERSITY OF USER COMMUNITY.
  - TASKS
  - FLIGHT SYSTEMS (E.G., DISCRETE VS. ANALOG, TELEMETRY VS. TRAJECTORY)
  - USER EXPERIENCE LEVEL
- REQUIREMENTS ARE EASILY MISINTERPRETED BY DEVELOPER.
  - USERS ORGANIZATIONALLY SEPARATED FROM DEVELOPERS.
  - WRITTEN DESCRIPTIONS OF VISUAL SYSTEMS IS INADEQUATE.
- THESE CONDITIONS ARE NOT UNIQUE TO NASA MISSION OPERATIONS.

## INTRODUCTION TO SESSION 1

### **REQUIREMENTS ANALYSIS FUNDAMENTALS**

- "REQUIREMENTS ANALYSIS, DOMAIN KNOWLEDGE, AND DESIGN," COLIN POTTS/MCC SOFTWARE TECHNOLOGY PROGRAM

**SUGGESTS INNOVATIVE METHODOLOGY TO:**

- ACCOMMODATE CHANGING/CONFLICTING REQUIREMENTS.
- SYSTEMATIZE TRANSLATION OF REQUIREMENTS INTO DESIGN, REDUCING MISINTERPRETATION.
- IMPROVE REQUIREMENTS COMPLETENESS.
- ENHANCE TRACEABILITY.

## INTRODUCTION TO SESSION 1 (CONTINUED)

- "KNOWLEDGE-BASED REQUIREMENTS ANALYSIS FOR AUTOMATING SOFTWARE DEVELOPMENT," LAWRENCE MARKOSIAN/REASONING SYSTEMS, INC.

PROPOSES NEW SOFTWARE DEVELOPMENT PARADIGM THAT:

- AUTOMATES DERIVATION OF IMPLEMENTATIONS FROM REQUIREMENTS, REDUCING MISINTERPRETATION.
- INCREASES DEVELOPMENT PRODUCTIVITY.
- VALIDATES FORMALIZED REQUIREMENTS.
- ENHANCES TRACEABILITY.